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[54]发明名称 内燃机车防沸、防冻冷却液

[57]摘要

本发明公开了一种特别适于铁路大功率内燃机车冬夏通用的防沸、防冻冷却液。这种冷却液用工业水直接配制：在工业水中添加质量百分数为30—65调节其沸点和冰点的乙二醇和防蚀、防腐、防锈和阻垢等综合效果优良的复合缓蚀剂后搅拌均匀即成。本发明冷却液，料源广，使用方便。可使机车停留时，-50℃不冻结，运行时，110℃不沸腾，走行20万公里以上，金属部件不穴蚀。不仅在汽车、拖拉机、工程机械、坦克等内燃机上使用效果好，还为铁路大功率内燃机车提高速度、增大功率、加快周转、减少打温和节能降耗创造了技术条件。

说　明　书

内燃机车防沸、防冻冷却液

本发明涉及一种既防冻，又防沸且缓蚀效果优良的内燃机车冷却液，是一种特别适用于铁路大功率内燃机车冬夏通用的冷却液。

内燃机车采用循环水作为柴油机汽缸套、机体、热交换器、中冷器、散热器、水泵等部件的冷却液，并在冷却液中添加料源广、成本低的缓蚀剂：防垢、防腐、抗穴蚀，以达到节约燃油，延长检修周期，充分发挥机车功率的目的。中国专利94113222.6公开了可用工业水配制的冷却液，其虽然在缓蚀效能相同的基础上达到了降低成本，方便使用的目标，但它在实际使用中，机车水温高于100℃即沸腾串水自动停机。低于0℃即结冰，发生水冷系统冻害事故，限制了铁路机车高负荷运行时的牵引功率。机车冬季停留时，须用柴油机进行低转速，空转防寒打温。同此，造成大量的机油消耗。

本发明的目的是提供一种用工业水配制，机车走行二十万公里不穴蚀，且停留时，-50℃不结冰，运行时，110℃不沸腾的冬夏通用的内燃机车冷却液。

本发明的目的这样实现：在工业水中，添加难挥发的多价醇如乙二醇，调节工业水的冰点和沸点；添加由钼酸钠、硅酸钠、苯甲酸钠、磷酸二氢钠、三乙醇胺、苯骈三氮唑、聚马来酸酐、乙二胺四甲叉磷酸钠组成，且缓蚀、阻垢、防腐和防锈等综合性能优良的缓蚀剂，并通过对上述各组分用量的科学选定，配制本发明冷却液。本冷却液用NaOH调节PH值＞8，其具体配方如下（质量百分数）：乙二醇 30-65 、磷酸二氢钠 2.0-4.0 、三乙醇胺 1.0-3.0 、苯甲酸钠 1.0-2.0 、钼

发明所用原料资源广泛，生产方法简单，价格比市售日本TCL防冻液低三分之一以上。具有较大的经
济效能。

下面结合实施例对本发明作进一步详细说明：按下述质量百分数分别称取实施例1#、2#3#各组分：

组分 / 例号	组分编号									
	a	b	c	d	e	f	g	h	i	j
1#	30	3.8	1.5	2.0	0.8	0.3	0.10	0.15	0.3	余量
2#	55	5.6	2.0	1.6	1.0	0.2	0.10	0.10	0.1	
3#	65	2.0	3.0	1.0	1.5	0.1	0.15	0.05	0.1	
备注	1#、2#、3#的冰点分别为-15℃、-35℃、-50℃									

表中a为乙二醇，b为磷酸二氢钠，c为三乙醇胺，d为苯甲酸钠，e为钼酸钠，f为M>3的硅酸钠，g为苯骈三氮唑，h为聚马来酸酐，i为乙二胺四甲叉磷酸钠，j为工业水（非碳酸盐硬度小于1.0毫克·当量/升或符合铁路蒸气机车锅炉给水水质标准的工业水）；各组分称量备齐后，首先把苯骈三氮唑用热水或乙醇溶解之后即可同其它药剂一起投入工业水中溶解、稀释到规定浓度，搅拌均匀即配制成。必要时用氢氧化钠调整PH值大于8。

本发明的冷却水，经委托北京航空航天大学使用FDO-2型电偶腐蚀仪，特制与内燃机车相同的六种金属试片，采用线性极化法，要80±2℃通空气连续80小时的相同模拟条件下，同我国铁路机车现用的1#硅系复合配方去离子水冷却液和日本谷川油化兴业株式会社生产的TCL不冻液（在中国的商标注册证第269424）按其说明配成-35℃的使用浓度冷却液同本发明2#冷却液作了评价比较试验。其结果如下表所示：

结果显示：本发明的缓蚀效率高达98.99%，比日本产TCL不冻液高2.23%。腐蚀速度只0.009mm/a，所以本发明不仅能在汽车、坦克、拖拉机和工程机机械上使用，在大功率内燃机上也可以使用。

本发明冷却液用于机车，机车走行二十万公里不穴蚀，并且停留时-50℃不结冰，运行时，水温110℃不沸腾。是一种可冬夏通用的内燃机车冷却液，其为内燃机车提高速度，增大功率，加快周转，减少打温，实现节能降耗创造了条件。

Description

It is an object of the present invention to provide a coolant for diesel locomotives which is prepared from industrial water and usable all year round because it never forms cavitation even after the running of locomotives for 200 thousand kilometers, neither freezes up at -50℃ when standing still nor boils at 100℃ when running.

The object is achieved by the following steps: introducing a less volatile multivalent alcohol such as ethylene glycol into the industrial water, adjusting the freezing and boiling points of said industrial water; adding in a corrosion-retarding agent, consisting of sodium molybdate, sodium silicate, sodium benzoate, sodium dihydrogen phosphate, triethanolamine, benzotriazole, polymaleic anhydride, ethylene diamine tetra methylene phosphonic acid sodium, and exhibiting an excellent integrated performance in terms of corrosion retardance, dirt inhibition, anticorrosion and antirust; and by determining the applied amounts of said components in a scientific manner, the coolant of the invention is prepared thereby. NaOH is herein used to adjust PH of the coolant to a value >8, wherein the specific formulation of said base comprises (in weight percentage): 30-65 % of ethylene glycol, 2.0-4.0% of sodium dihydrogen phosphate, 1.0-3.0% of triethanolamine, 1.0-2.0% of sodium benzoate, 0.5-1.5% of sodium molybdate, 0.1-0.3% of sodium silicate with M>3, 0.10-0.15% of benzotriazole, 0.05-0.15% of polymaleic anhydride, 0.1-0.3% of ethylene diamine tetra methylene phosphonic acid sodium and the rest industrial water. Wherein ethylene glycol is a less volatile multivalent alcohol having a boiling point of 197.2℃, and mixtures thereof with water in different ratios can be used to adjust the evaporation velocity of water and reduce the freezing point thereby; sodium silicate (M>3) is a viscous liquid. The precipitation membrane-type corrosion-retarding agent is capable of simultaneously retarding the cathodic and anodic processes, and is effective in retarding corrosion of various metals.

The coolant of the present invention is advantageous in the following aspects: a high corrosion-retarding efficiency; a slow corrosion velocity; easily prepared from industrial water, i.e. any industrial water is applicable as long as meeting the quality standard set for water supplied to the boiler of railway steam locomotives, and diesel locomotives can also be supplied with water along the railway line like steam locomotives, so as to simplify the preparation work for locomotives and greatly increase the running efficiency; a high utilization efficiency.

The coolant of the invention does not freeze up at -50℃. Thus, it is useful in eliminating from the root the frequent freezing injury to locomotives while standing still in winter to avoid loss, and as well reducing idle running of locomotives for raising temperature in winter, thereby prolonging the lifetime thereof, saving energy, lowering loss and generating more incomes. Furthermore, the coolant does not boil at 110℃. As a result, it can get rid of shutdown accidents from dampening which often happen in locomotives running at a full load, and also create a condition favorable for the development of railway locomotives in our country towards a high efficiency and high velocity. The materials employed in the present invention are widely available, the production process is easy to handle, and the price is only less than 1/3 of the market-available Japan TCL coolant. Thus the product of the invention has a high economic efficiency.

Part of RI (CN 1174186A):

Anti-boiling and Anti-freezing Coolant for Diesel Locomotives

Claims:

1. An anti-boiling and anti-freezing coolant for diesel locomotives, characterized in being formulated from the materials having the weight percentages as follows: 30-65 % of ethylene glycol, 2.0-4.0% of sodium dihydrogen phosphate, 1.0-3.0% of triethanolamine, 1.0-2.0% of sodium benzoate, 0.5-1.5% of sodium molybdate, 0.1-0.3% of sodium silicate with M>3, 0.05-0.15% of benzotriazole, 0.05-0.15% of polymaleic anhydride, 0.1-0.3% of ethylene diamine tetra methylene phosphonic acid sodium and the rest industrial water with a non-carbonate hardness less than 1.0mg/eq/l.

2. The coolant according to claim 1, characterized in that during the preparation, benzotriazole is firstly dissolved with hot water or ethanol prior to be introduced into the industrial water together with other components for further dissolving and homogeneous stirring to obtain the product

3. The coolant according to claim 1, characterized in that NaOH is used to adjust the PH to a value greater than 8.